Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Timothy H. Provan
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

1596 West North Temple
Salt Lake City, Utah 84116-3195
801-533-9333

Jan. 23, 1990

Bruce Bonebrake
622 North Main Street
Box 606
Cedar City, UT 84720

Dear Bruce;

I have reviewed the Heccla reclamation information you sent me. I have a few comments, concerns, and suggestions:

1. I question the use of irrigation (sprinklers). Irrigation promotes germination establishment and growth as long as it is employeed. The vegetation will be there because of the additional water. What happens when it is removed? Experience has demonstrated that, a- there is considerable death of established plants following removal of additional water. If normal precipitation is not sufficient to sustain those established species, than other species should be considered for the first planting, b) irrigation promotes surface and near surface rooting, rather than forcing root growth down. For plants to survive in that area they need to be deep rooted. Where irrigation could be beneficial is during establishment (April, May) in a drought year. If irrigation is used, it should be used sparingly, one or two light turns for establishment and no more than two heavy turns throughout the summer. Heavy irrigation will move water through the topsoil, rocks, and into the subsoil, which will encourage deeper root penetration resulting in greater chance for survival following removal of irrigation, c) irrigation will favor the more aggressive species. The slower growing species (shrubs and some forbs) are generally outcompeted where irrigation is used, and d) the 1980 seeding was successful without irrigation (no mention was made of its use), why go to the extra expense and trouble if it is not needed and probably is not desirable?

2. Mention is made of fertilization. Fertilization requires additional water. If dry area fertilization results in reduced establishment, production, and persistence. If it has a positive effect, the plants are there because of the fertilizer, what happens to them when fertilization stops?

3. Four inches of top soil over six inches of rock does not provide the best environment for plant persistence and maintenance, especially in a dry area. There will be very little soil moisture capacity in four inches and none in the rock layer. Unless the amount of topsoil is greater and then mixed somewhat with the rock, I would not expect much perennial vegetation to establish and persist. Heavy equipment used to haul and move material and slope the area can compact the surface and subsoil, resulting in little root penetration, hard pan like layers, and etc. I would suggest that following sloping, the complete area should be ripped 2-4 feet deep, this will mix the topsoil and rock, break up compacted soil catchment basins, increase water infiltration and water hold capacity, improve rooting and creates microhabitat and climates for germination, establishment and reproduction.

4. The area will not be returned to predisturbed conditions. The complete site; soil, moisture, and temperature have all changed sub climax on climax vegetation will not persist on a disturbed site. Ecologically you have to start with pioneering species, at the same time provide for soil stabilization.

5. The following species can be successfully transplanted and should do well on the area:

    Wyoming big sagebrush
    Black sagebrush
    Green rubber rabbitbrush
    White rubber rabbitbrush
    Low rabbitbursh
    Winterfat
    Forage kochia

    If you are going to transplant, transplants need to be ordered one year in advance.

    I recommend 0-1 or 0-2 bareroot and wilding stock. Species that should be adapted to disturbed areas like your site and have the potential to come well from direct seeding includes;

Species	Lbs PLS per acre
Bottlebrush squirreltail*	0.5
Needle-and-thread*	0.5
Crested wheatgrass ('Nordan', 'Fairway', 'Ephraim', 'Hycrest')	1.5
Pubescent wheatgrass ('Luna')	1.0
Russian wildrye ('Boizoisky')	1.0
Lewis flax*	0.5
Palmer penstemon*	0.5
Yellow sweetclover	1.0
Alfalfa ('Ladak', 'Nomad', Spreader II)	1.0
Goosberryleaf and/or common globemallow*	0.5
Small burnet	1.0
Winterfat*	1.0
Wyoming big sagebrush*	0.5
Black sagebrush*	0.5
Green and white rubber rabbitbrush*	1.0
Low rabbitbrush*	0.5
Fourwing saltbush*	1.0
Forage kochia	0.5
	14.0

*native to southern Utah

PLS lbs per acre

6. All seeding should occur in November and December and all transplanting should be done just following snow melt and prior to early spring snow and rain storms. I would suspect that this would be the last two weeks of February, and the first or second week in March. No transplanting after this date. Transplanting is best done the spring following direct seeding.

7. Grasses and forbs and a few shrubs can be direct seeded with a Rangeland drill. A good majority of the shrubs will not go through the drill. Forbs and shrubs should not be drilled in the same drops (drill row) as the grasses. When competitive grasses are seeded with less competitive slower developing shrubs and forbs, they out compete them and all you will have is a grass community. Preferred way of seeding would be to a) rip the complete area, b) hand broadcast the shrubs mix, c) seed mix with cardboard portions in planter box. Seed grasses in some type of alternating row pattern. Forbs mix may have to be mixed with rice hulls to make the same volume as the grass mix or be seeded in fewer numbers of drops.

8. The area should be fenced to keep livestock out. Care needs to be taken to insure that the area is not damaged once the fence is removed, since the area will probably have better quality and quantity of forage than adjoining areas.

I hope that these suggestions will be helpful. Call if you have questions. You will have to contact John Fairchild regarding the division providing seed.

Sincerely,

Richard Stevens by Carolyn

Richard Stevens